

REMARKS

Reconsideration and allowance are respectfully requested in light of the above amendments and the following remarks.

Claim 8 has been amended to place it in compliance with U.S. practice, to provide antecedent basis for terminology, and to better define the subject matter the Applicants regard as the invention. Support for the features newly recited in claim 8 is provided in the specification on page 28, line 15, through page 29, line 21. Other claims are also revised for formal matters.

Claims 1-3 and 7 stand rejected, under 35 USC §102(e), as being anticipated by Hirahara et al. (US 2002/0160252). Claims 1-3 and 7 also stand rejected, under 35 USC §103(a), as being unpatentable over Hirahara. Claim 4 stands rejected, under 35 USC §103(a), as being unpatentable over Hirahara in view of Kawahara et al. (US 2002/0045089). Claim 5 stands rejected, under 35 USC §103(a), as being unpatentable over Hirahara in view of Grot (US 6,641,862). Claim 6 stands rejected, under 35 USC §103(a), as being unpatentable over Hirahara in view of Menashi et al. (US 2003/0022055). Claim 7 stands rejected, under 35 USC §103(a), as being unpatentable over Hirahara in view of Sugawara et al. (US 6,818,339). Claim 8 was rejected, under 35 USC §103(a), as being unpatentable over Hirahara in view of Masaru

(JP 2001-085019). The Applicants respectfully traverse the rejections.

Hirahara fails to disclose the feature recited in claim 1 of a carbon fiber fabric having warp and weft threads woven such that the distance X between adjacent intersections, where the warp and weft threads cross each other, and the thickness Y of the fabric satisfy the equation  $1.4 \leq X/Y \leq 3.5$ . While acknowledging that Hirahara provides no express disclosure of this feature (see Office Action page 3, last 5 lines of first paragraph), the Office Action proposes that Hirahara inherently discloses the feature (see page 3, last 5 lines of first paragraph).

However, as noted in the Office Action, the Federal Circuit stated in *In re Robertson* that to establish inherency, the missing descriptive matter must be recognized by persons of ordinary skill in the art as necessarily present in the thing described in the reference. Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) and MPEP §2112, 3<sup>rd</sup> paragraph.

The Office Action proposes that because the material of construction of the fabric disclosed by Hirahara and that recited

in claim 1 have similar dimensions (i.e., a warp density of 70 yarns per inch and a weft density of 54 yarns per inch), Hirahara must necessarily inherently disclose a carbon fiber fabric having warp and weft threads woven such that the distance X between adjacent intersections, where the warp and weft threads cross each other, and the thickness Y of the fabric satisfy the equation  $1.4 \leq X/Y \leq 3.5$  (Office Action page 3, lines 11-15). However, the Office Action subsequently acknowledges that a skilled artisan would have to adjust the warp density, weft density, and the weaving process to yield the desirable ratio of X/Y in Hirahara's structure (page 4, lines 3-9). The Applicants note that while the Office Action may present alternative grounds for rejecting a claim, any conflicting arguments presented by the Office in support of these grounds may be brought to bear against the rejection by Applicants.

Even if it were assumed, *arguendo*, that Hirahara's fabric and the claimed fabric have similar dimensions, as proposed in the Office Action, the Office Action expressly acknowledges that a skilled artisan would have to adjust one or more parameters of Hirahara's woven fabric "to yield the desirable ratio of X/Y" recited in claim 1. Therefore, it necessarily follows from the Office Action's statements that the desirable ratio of X/Y (i.e., the claimed feature the Office Action acknowledges to be missing

from Hirahara's disclosure) is not present in Hirahara's structure.

As noted in the Office Action, the mere fact that a certain thing may result from a given set of circumstances is not sufficient to support an argument of inherency. The admission in the Office Action precludes the possibility that the above-described feature recited in claim 1 must necessarily exist in Hirahara's structure. Accordingly, the Applicants respectfully submit that Hirahara does not anticipate the subject matter defined by claim 1.

Regarding the obviousness rejection applied to claim 1, based on Hirahara's teachings, the Office Action cites *In re Boesch* for the proposition that the discovery of an optimum value of a result effective variable in a known process is within the skill of the routine artisan (see Office Action page 4, lines 9-11). The *Boesch* court cited *In re Antonie* for this principle.

In *In re Antonie*, the court reversed the Patent and Trademark Office Board of Appeals regarding the obviousness of the claims in issue with the following reasoning:

*In In re Aller*, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955), the court set out the rule that the discovery of an optimum value of a variable in a known process is normally obvious. We have found exceptions to this rule in cases where the results of optimizing a variable, which was known to be result effective, were unexpectedly good. *In re Waymouth*, 499 F.2d 1273, 182

*USPQ 290 (CCPA 1974); In re Saether, supra. This case, in which the parameter optimized was not recognized to be a result-effective variable, is another exception. The decision of the board is reversed.*

*In re Antonie, 559 F.2d 618, 620 (CCPA 1977) (emphasis added).*

Similar to the situation in *In re Antonie*, the parameter optimized according to instant claim 1 was not recognized by skilled artisans to be a result-effective variable for achieving an object of the invention. Although not limited to this object, the specification identifies Applicants' desire to reduce the concave and convex portions in the thickness of a fuel cell's woven fabric, so as to diminish the potential for these portions to pierce an adjacent polymer electrolyte membrane and, thereby, to generate micro short circuits in the fuel cell (see specification page 5, first paragraph).

The Office Action concludes that the claimed ratio of X/Y was known by skilled artisans to be a result effective variable for a process at the time of the present invention (see Office Action page 4, lines 6-11). However, the only process identified in the Office Action is that of weaving a fabric (Office Action page 4, line 8). And with respect to the process of weaving a fabric, the Office Action neither explains what result the claimed ratio of X/Y was known to effectively achieve nor how the claimed range for this ratio, recited in claim 1, optimizes the

result. With this in mind, the Office Action's conclusion may be more explicitly stated, when viewed in the context of the factual record, as: The discovery of the optimal value of a heretofore undisclosed ratio to achieve an indeterminate result in weaving a fabric is within the pale of obviousness for one of ordinary skill in the art. This more contextually explicit form of the Office Action's proposed conclusion better conveys its foundational inadequacy. Simply put, a person of ordinary skill in the art would not find it obvious to modify an unknown variable to achieve an indeterminate result because there can be no reasonable motivation for doing so.

Accordingly, the Applicants respectfully submit that Hirahara neither discloses nor suggests the subject matter defined by claim 1. Independent claim 7 similarly recites the above-described feature distinguishing claim 1 from Hirahara. Therefore, allowance of claims 1 and 7 and all claims dependent therefrom is warranted.

Regarding the rejection of claim 7 over the teachings of Hirahara and Sugawara, Sugawara is cited only for providing the teaching to clamp end plates of a fuel cell module. Sugawara is not cited for teaching the feature recited in claim 7 of a carbon fiber fabric having warp and weft threads woven such that the distance X between adjacent intersections, where the warp and

weft threads cross each other, and the thickness Y of the fabric satisfy the equation  $1.4 \leq X/Y \leq 3.5$ . For the reasons discussed above in connection with claim 1, Hirahara does not suggest these features. Accordingly, the combined teachings of Hirahara and Sugawara do not render obvious the subject matter of claim 7. Therefore, allowance of claim 7 is warranted.

Claim 8 now recites the feature of smoothing the rough surface of a carbon fabric by heating, with flame radiation, laser radiation, or a radiant heater, the surface of a gas diffusion layer before disposing the gas diffusion layer on a polymer electrolyte membrane. In an exemplary, but non-limiting embodiment of the invention, this feature provides the benefit of removing hydrophilic functional groups present on the surface of the carbon fiber. Removing the hydrophilic functional groups imparts water repellency to the carbon fiber, improves the moisture retention of the polymer electrolyte contained in the MEA, and improves a cell's ability to rapidly and safely discharge excess water produced during the operation of the cell.

By contrast to the newly recited feature in claim 8, Masaru only discloses applying a hot press to a carbon cloth to flatten its surface. Hirahara is not cited in the Office Action for supplementing the teachings of Masaru with respect to heating the carbon cloth.

Accordingly, the Applicants submit that the applied references, considered alone or together, do not teach or suggest the subject matter defined by claim 8. Therefore, allowance of claim 8 is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,



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